What is claimed is:

1. A method of manufacturing a semiconductor structure, the method comprising:

providing a semiconductor substrate or substrate assembly;

providing a vapor comprising one or more Group IIA metal precursor compounds of the formula $M(NRR')_2$, wherein R and R' are each independently an organic group and M is selected from the group consisting of barium, strontium, calcium, and magnesium; and

directing the vapor comprising the one or more Group IIA metal precursor compounds to the semiconductor substrate or substrate assembly to form a metal-containing layer on a surface of the semiconductor substrate or substrate assembly using an atomic layer deposition process comprising a plurality of deposition cycles.

2. The method of claim 1 wherein the semiconductor substrate or substrate assembly is a silicon wafer.

3. The method of claim 1 wherein the formed metal-containing layer has a thickness of about 10 Å to about 500 Å.

4. The method of claim 1 wherein M is strontium or barium.

5. The method of claim 1 wherein each R and R' is independently a (C1-C10)organic group.

6. The method of claim 1 wherein the metal-containing layer is a metal oxide layer.

7. The method of claim 1 wherein the metal-containing layer is a dielectric layer.

8. A method of manufacturing a semiconductor structure, the method comprising:

providing a semiconductor substrate or substrate assembly;

providing a vapor comprising one or more Group IIA metal precursor compounds of the formula $M(NRR')_2$ (Formula I), wherein R and R' are each independently an organic group and M is selected from the group consisting of barium, strontium, calcium, and magnesium;

providing one or more reaction gases; and

directing the vapor comprising the one or more Group IIA metal precursor compounds and the one or more reaction gases to the semiconductor substrate or substrate assembly to form a metal-containing layer on a surface of the semiconductor substrate or substrate assembly using an atomic layer deposition process comprising a plurality of deposition cycles.

9. The method of claim 8 further comprising providing a vapor comprising one or more metal-containing precursor compounds other than the compounds of Formula I and directing this vapor to the semiconductor substrate or substrate assembly to form a metal-containing layer.

10. The method of claim 9 wherein providing a vapor comprising one or more metal-containing precursor compounds other than the compounds of Formula I comprises providing a vapor comprising $Ti(AR^1_x)_4$, wherein: A is O, N, C(O), or OC(O); and R^1 is a (C1-C10)alkyl group, wherein two of the R^1 alkyl groups are optionally joined together to form an alkylene group; and n = 1 or 2.

11. The method of claim 10 wherein the formed metal-containing layer is strontium titanate, barium titanate, or barium-strontium titanate.

12. The method of claim 8 wherein M is strontium or barium.

13. The method of claim 8 wherein the metal-containing layer is a metal oxide layer.

14. The method of claim 8 wherein the metal-containing layer is a dielectric layer.

15. A method of manufacturing a semiconductor structure, wherein the method comprises:

providing a semiconductor substrate or substrate assembly within a deposition chamber;

providing a vapor comprising one or more Group IIA metal precursor compounds of the formula $M(NRR')_2$ (Formula I), wherein R and R' are each independently an organic group, and M is selected from the group consisting of barium, strontium, calcium, and magnesium;

directing the vapor comprising the one or more precursor compounds of Formula I to the semiconductor substrate or substrate assembly and allowing the one or more compounds to chemisorb to one or more surfaces of the semiconductor substrate or substrate assembly;

providing one or more reaction gases;

directing the one or more reaction gases to the semiconductor substrate or substrate assembly with the chemisorbed species thereon to form a metal-containing layer on one or more surfaces of the semiconductor substrate or substrate assembly.

16. The method of claim 15 wherein one or more inert carrier gases are introduced into the chamber with the vapor comprising the one or more compounds of Formula I, with the one or more reaction gases, or with both the vapor and the reaction gases.

17. The method of claim 15 wherein the reaction gas is selected from the group consisting of water vapor, oxygen, ozone, hydrogen peroxide, nitrous oxide, ammonia, organic amine, silane, hydrogen, hydrogen sulfide, hydrogen selenide, hydrogen telluride, and combinations thereof.

18. The method of claim 17 wherein the reaction gas is water vapor.

19. The method of claim 15 wherein the metal-containing layer is a metal oxide layer.

20. The method of claim 15 wherein the metal-containing layer is a dielectric layer.

21. The method of claim 15 further comprising providing a vapor comprising one or more metal-containing precursor compounds other than the compounds of Formula I and directing this vapor to the semiconductor substrate or substrate assembly to allow these compounds to chemisorb to one or more surfaces of the semiconductor substrate or substrate assembly.

22. The method of claim 21 wherein providing a vapor comprising one or more metal-containing precursor compounds other than the compounds of Formula I comprises providing a vapor comprising $Ti(AR^1_x)_4$, wherein: A is O, N, C(O), or OC(O); and R^1 is a (C1-C10)alkyl group, wherein two of the R^1 alkyl groups are optionally joined together to form an alkylene group; and n = 1 or 2.

23. The method of claim 21 wherein the vapor comprising the one or more compounds of Formula I and the vapor comprising one or more compounds other than those of Formula I are directed to the semiconductor substrate or substrate assembly prior to directing the one or more reaction gases to the semiconductor substrate or substrate assembly.

24. The method of claim 21 wherein the vapor comprising the one or more compounds of Formula I and the vapor comprising one or more compounds other than those of Formula I are directed to the semiconductor substrate or substrate assembly substantially simultaneously.

25. The method of claim 21 comprising:

providing a vapor comprising one or more precursor compounds of Formula I and directing this vapor to the semiconductor substrate or substrate assembly and allowing the one or more compounds to chemisorb to one or more surfaces of the semiconductor substrate or substrate assembly;

providing one or more reaction gases and directing the one or more reaction gases to the semiconductor substrate or substrate assembly with the chemisorbed species thereon;

providing a vapor comprising one or more precursor compounds other than those of Formula I and directing this vapor to the semiconductor substrate or substrate assembly and allowing the one or more compounds to chemisorb to one or more surfaces of the semiconductor substrate or substrate assembly; and

providing one or more reaction gases and directing the one or more reaction gases to the semiconductor substrate or substrate assembly with the chemisorbed species thereon to form a metal-containing layer on one or more surfaces of the semiconductor substrate or substrate assembly.

26. The method of claim 21 further comprising purging excess vapor comprising the one or more precursor compounds from the deposition chamber after chemisorption of the compounds onto the semiconductor substrate or substrate assembly.

27. The method of claim 26 wherein purging comprises purging with an inert carrier gas.

28. The method of claim 27 wherein the inert carrier gas is selected from the group consisting of nitrogen, helium, and argon.

29. The method of claim 15 wherein providing a vapor, directing the vapor, providing one or more reaction gases, and directing the one or more reaction gases is repeated at least once.

30. The method of claim 15 wherein the temperature of the semiconductor substrate or substrate assembly is about 25°C to about 400°C.

31. The method of claim 15 wherein the deposition chamber pressure is about 10^{-4} torr to about 1 torr.

32. The method of claim 15 wherein the Group IIA metal precursor compound is of the formula $M[N(SiR"_3)_2]_2$, wherein each R" is independently a (C1-C3)alkyl moiety.

33. The method of claim 32 wherein the Group IIA metal precursor compound is selected from the group consisting of $Ba[N(SiMe_3)_2]_2$ and $Sr[N(SiMe_3)_2]_2$, where Me is methyl.

34. A method of forming a layer on a substrate, the method comprising:

providing a substrate;

providing a vapor comprising one or more Group IIA metal precursor compounds of the formula $M(NRR')_2$, wherein R and R' are each independently an organic group and M is selected from the group consisting of barium, strontium, calcium, and magnesium; and

directing the vapor comprising the one or more Group IIA metal precursor compounds to the substrate to form a metal-containing layer on a surface of the substrate using an atomic layer deposition process comprising a plurality of deposition cycles.

35. The method of claim 34 wherein M is strontium or barium.

36. The method of claim 34 wherein each R and R' is independently a (C1-C10)organic group.

37. The method of claim 34 wherein the metal-containing layer is a metal oxide layer.

38. A method of forming a layer on a substrate, the method comprising:

providing a substrate;

providing a vapor comprising one or more Group IIA metal precursor compounds of the formula $M(NRR')_2$ (Formula I), wherein R and R' are each independently an organic group and M is selected from the group consisting of barium, strontium, calcium, and magnesium;

providing one or more reaction gases; and

directing the vapor comprising the one or more Group IIA metal precursor compounds and the one or more reaction gases to the substrate to form a metal-containing layer on a surface of the substrate using an atomic layer deposition process comprising a plurality of deposition cycles.

39. The method of claim 38 further comprising providing a vapor comprising one or more metal-containing precursor compounds other than the compounds of Formula I and directing this vapor to the substrate to form a metal-containing layer.

40. The method of claim 39 wherein providing a vapor comprising one or more metal-containing precursor compounds other than the compounds of Formula I comprises providing a vapor comprising $Ti(AR^1_x)_4$, wherein: A is O, N, C(O), or OC(O); and R^1 is a (C1-C10)alkyl group, wherein two of the R^1 alkyl groups are optionally joined together to form an alkylene group; and n = 1 or 2.

41. The method of claim 40 wherein the formed metal-containing layer is strontium titanate, barium titanate, or barium-strontium titanate.

42. The method of claim 38 wherein M is strontium or barium.

43. The method of claim 38 wherein the metal-containing layer is a metal oxide layer.

44. A method of forming a layer on a substrate, wherein the method comprises:

providing a substrate within a deposition chamber;

providing a vapor comprising one or more Group IIA metal precursor compounds of the formula $M(NRR')_2$ (Formula I), wherein R and R' are each independently an organic group, and M is selected from the group consisting of barium, strontium, calcium, and magnesium;

directing the vapor comprising the one or more precursor compounds of Formula I to the substrate and allowing the one or more compounds to chemisorb to one or more surfaces of the substrate;

providing one or more reaction gases; and

directing the one or more reaction gases to the substrate with the chemisorbed species thereon to form a metal-containing layer on one or more surfaces of the substrate.

45. The method of claim 44 wherein one or more inert carrier gases are introduced into the chamber after the vapor comprising the one or more compounds of Formula I, after the one or more reaction gases, or after both the vapor and the reaction gases.

46. The method of claim 45 wherein the reaction gas is selected from the group consisting of water vapor, oxygen, ozone, hydrogen peroxide, nitrous oxide, ammonia, organic amine, silane, hydrogen, hydrogen sulfide, hydrogen selenide, hydrogen telluride, and combinations thereof.

47. The method of claim 46 wherein the reaction gas is water vapor.

48. The method of claim 45 wherein the metal-containing layer is a metal oxide layer.

49. The method of claim 44 further comprising providing a vapor comprising one or more metal-containing precursor compounds other than the compounds of Formula I and directing this vapor to the substrate to allow these compounds to chemisorb to one or more surfaces of the substrate.

50. The method of claim 49 wherein providing a vapor comprising one or more metal-containing precursor compounds other than the compounds of Formula I comprises providing a vapor comprising $Ti(AR^1_x)_4$, wherein: A is O, N, C(O), or OC(O); and R^1 is a (C1-C10)alkyl group, wherein two of the R^1 alkyl groups are optionally joined together to form an alkylene group; and n = 1 or 2.

51. The method of claim 49 wherein the vapor comprising the one or more compounds of Formula I and the vapor comprising one or more compounds other than those of Formula I are directed to the substrate prior to directing the one or more reaction gases to the substrate.

52. The method of claim 49 wherein the vapor comprising the one or more compounds of Formula I and the vapor comprising one or more compounds other than those of Formula I are directed to the substrate substantially simultaneously.

53. The method of claim 49 comprising:

providing a vapor comprising one or more precursor compounds of Formula I and directing this vapor to the substrate and allowing the one or more compounds to chemisorb to one or more surfaces of the substrate;

providing one or more reaction gases and directing the one or more reaction gases to the substrate with the chemisorbed species thereon;

providing a vapor comprising one or more precursor compounds other than those of Formula I and directing this vapor to the substrate and allowing the one or more compounds to chemisorb to one or more surfaces of the substrate; and

providing one or more reaction gases and directing the one or more reaction gases to the substrate with the chemisorbed species thereon to form a metal-containing layer on one or more surfaces of the substrate.

54. The method of claim 49 further comprising purging excess vapor comprising the one or more precursor compounds from the deposition chamber after chemisorption of the compounds onto the substrate.

55. The method of claim 44 wherein the providing a vapor, directing the vapor, providing one or more reaction gases, and directing the one or more reaction gases is repeated at least once.

56. The method of claim 44 wherein the Group IIA metal precursor compound is of the formula $M[N(SiR"_3)_2]_2$, wherein each R" is independently a (C1-C3)alkyl moiety.

57. A method of manufacturing a memory device structure, the method comprising:

providing a substrate having a first electrode thereon;

providing one or more Group IIA metal precursor compounds of the formula $M(NRR')_4$, wherein R and R' are each independently an organic group and M is selected from the group consisting of barium, strontium, calcium, and magnesium;

vaporizing the one or more precursor compounds;

directing the one or more vaporized precursor compounds to the substrate to chemisorb the compounds on the first electrode of the substrate;

providing one or more reaction gases;

directing the one or more reaction gases to the substrate with the chemisorbed compounds thereon to form a dielectric layer on the first electrode of the substrate; and

forming a second electrode on the dielectric layer.

58. The method of claim 57 wherein the Group IIA metal precursor compound is of the formula $M[N(SiR"_3)_2]_2$, wherein each R" is independently a (C1-C3)alkyl moiety.

59. An atomic layer vapor deposition apparatus comprising:

a deposition chamber having a substrate positioned therein; and

one or more vessels comprising one or more Group IIA metal precursor compounds of the formula $M(NRR')_2$, wherein R and R' are each independently an organic group and M is selected from the group consisting of barium, strontium, calcium, and magnesium.

60. The apparatus of claim 59 wherein the Group IIA metal precursor compound is of the formula $M[N(SiR"_3)_2]_2$ where M is strontium or barium and R" is a (C1-C3)alkyl moiety.

61. A method of manufacturing a semiconductor structure, the method comprising:

providing a semiconductor substrate or substrate assembly;

providing a vapor comprising one or more Group IIA metal precursor compounds of the formula $M(NRR')_2$, wherein R and R' are each independently an organic group and M is selected from the group consisting of barium, strontium, calcium, and magnesium; and

directing the vapor comprising the one or more Group IIA metal precursor compounds to the semiconductor substrate or substrate assembly to form a metal-containing layer on a surface of the semiconductor substrate or substrate assembly using a chemical vapor deposition process.

62. The method of claim 61 wherein the semiconductor substrate or substrate assembly is a silicon wafer.

63. The method of claim 61 wherein the formed metal-containing layer has a thickness of about 10 Å to about 500 Å.

64. The method of claim 61 wherein M is strontium or barium.

65. The method of claim 61 wherein each R and R' is independently a (C1-C10)organic group.

66. The method of claim 61 wherein the metal-containing layer is a metal oxide layer.

67. The method of claim 61 wherein the metal-containing layer is a dielectric layer.

68. A method of manufacturing a semiconductor structure, the method comprising:

providing a semiconductor substrate or substrate assembly;

providing a vapor comprising one or more Group IIA metal precursor compounds of the formula $M(NRR')_2$ (Formula I), wherein R and R' are each

independently an organic group and M is selected from the group consisting of barium, strontium, calcium, and magnesium;

providing one or more reaction gases; and

directing the vapor comprising the one or more Group IIA metal precursor compounds and the one or more reaction gases to the semiconductor substrate or substrate assembly to form a metal-containing layer on a surface of the semiconductor substrate or substrate assembly using a chemical vapor deposition process.

69. The method of claim 68 further comprising providing a vapor comprising one or more metal-containing precursor compounds other than the compounds of Formula I and directing this vapor to the semiconductor substrate or substrate assembly to form a metal-containing layer.

70. The method of claim 69 wherein providing a vapor comprising one or more metal-containing precursor compounds other than the compounds of Formula I comprises providing a vapor comprising $Ti(AR^1_x)_4$, wherein: A is O, N, C(O), or OC(O); and R^1 is a (C1-C10)alkyl group, wherein two of the R^1 alkyl groups are optionally joined together to form an alkylene group; and n = 1 or 2.

71. The method of claim 70 wherein the formed metal-containing layer is strontium titanate, barium titanate, or barium-strontium titanate.

72. The method of claim 68 wherein M is strontium or barium.

73. The method of claim 68 wherein the metal-containing layer is a metal oxide layer.

74. The method of claim 68 wherein the metal-containing layer is a dielectric layer.

75. A method of manufacturing a semiconductor structure, wherein the method comprises:

providing a semiconductor substrate or substrate assembly within a deposition chamber;

providing a vapor comprising one or more Group IIA metal precursor compounds of the formula $M(NRR')_2$ (Formula I), wherein R and R' are each independently an organic group, and M is selected from the group consisting of barium, strontium, calcium, and magnesium;

directing the vapor comprising the one or more precursor compounds of Formula I to the semiconductor substrate or substrate assembly;

providing one or more reaction gases;

directing the one or more reaction gases to the semiconductor substrate or substrate assembly to form a metal-containing layer on one or more surfaces of the semiconductor substrate or substrate assembly using a chemical vapor deposition process.

76. The method of claim 75 wherein one or more inert carrier gases are introduced into the chamber with the vapor comprising the one or more compounds of Formula I, with the one or more reaction gases, or with both the vapor and the reaction gases.

77. The method of claim 75 wherein the reaction gas is selected from the group consisting of water vapor, oxygen, ozone, hydrogen peroxide, nitrous oxide, ammonia, organic amine, silane, hydrogen, hydrogen sulfide, hydrogen selenide, hydrogen telluride, and combinations thereof.

78. The method of claim 77 wherein the reaction gas is water vapor.

79. The method of claim 75 wherein the metal-containing layer is a metal oxide layer.

80. The method of claim 75 wherein the metal-containing layer is a dielectric layer.

81. The method of claim 75 further comprising providing a vapor comprising one or

more metal-containing precursor compounds other than the compounds of Formula I and directing this vapor to the semiconductor substrate or substrate assembly.

82. The method of claim 81 wherein providing a vapor comprising one or more metal-containing precursor compounds other than the compounds of Formula I comprises providing a vapor comprising $Ti(AR^1_x)_4$, wherein: A is O, N, C(O), or OC(O); and R^1 is a (C1-C10)alkyl group, wherein two of the R^1 alkyl groups are optionally joined together to form an alkylene group; and n = 1 or 2.

83. The method of claim 81 wherein the vapor comprising the one or more compounds of Formula I and the vapor comprising one or more compounds other than those of Formula I are directed to the semiconductor substrate or substrate assembly prior to directing the one or more reaction gases to the semiconductor substrate or substrate assembly.

84. The method of claim 81 wherein the vapor comprising the one or more compounds of Formula I and the vapor comprising one or more compounds other than those of Formula I are directed to the semiconductor substrate or substrate assembly substantially simultaneously.

85. The method of claim 81 comprising:

providing a vapor comprising one or more precursor compounds of Formula I and directing this vapor to the semiconductor substrate or substrate assembly;

providing one or more reaction gases and directing the one or more reaction gases to the semiconductor substrate or substrate assembly;

providing a vapor comprising one or more precursor compounds other than those of Formula I and directing this vapor to the semiconductor substrate or substrate assembly; and

providing one or more reaction gases and directing the one or more reaction gases to the semiconductor substrate or substrate assembly to form a metal-containing

layer on one or more surfaces of the semiconductor substrate or substrate assembly.

86. The method of claim 75 wherein providing a vapor, directing the vapor, providing one or more reaction gases, and directing the one or more reaction gases is repeated at least once.

87. The method of claim 75 wherein the Group IIA metal precursor compound is of the formula $M[N(SiR"_3)_2]_2$, wherein each R" is independently a (C1-C3)alkyl moiety.

88. The method of claim 87 wherein the Group IIA metal precursor compound is selected from the group consisting of $Ba[N(SiMe_3)_2]_2$ and $Sr[N(SiMe_3)_2]_2$, where Me is methyl.

89. A method of forming a layer on a substrate, the method comprising:

providing a substrate;

providing a vapor comprising one or more Group IIA metal precursor compounds of the formula $M(NRR')_2$, wherein R and R' are each independently an organic group and M is selected from the group consisting of barium, strontium, calcium, and magnesium; and

directing the vapor comprising the one or more Group IIA metal precursor compounds to the substrate to form a metal-containing layer on a surface of the substrate using a chemical vapor deposition process.

90. The method of claim 89 wherein M is strontium or barium.

91. The method of claim 89 wherein each R and R' is independently a (C1-C10)organic group.

92. The method of claim 89 wherein the metal-containing layer is a metal oxide layer.

93. A method of forming a layer on a substrate, the method comprising:

providing a substrate;

providing a vapor comprising one or more Group IIA metal precursor compounds of the formula $M(NRR')_2$ (Formula I), wherein R and R' are each independently an organic group and M is selected from the group consisting of barium, strontium, calcium, and magnesium;

providing one or more reaction gases; and

directing the vapor comprising the one or more Group IIA metal precursor compounds and the one or more reaction gases to the substrate to form a metal-containing layer on a surface of the substrate using a chemical vapor deposition process.

94. The method of claim 93 further comprising providing a vapor comprising one or more metal-containing precursor compounds other than the compounds of Formula I and directing this vapor to the substrate to form a metal-containing layer.

95. The method of claim 94 wherein providing a vapor comprising one or more metal-containing precursor compounds other than the compounds of Formula I comprises providing a vapor comprising $Ti(AR^1_x)_4$, wherein: A is O, N, C(O), or OC(O); and R^1 is a (C1-C10)alkyl group, wherein two of the R^1 alkyl groups are optionally joined together to form an alkylene group; and n = 1 or 2.

96. The method of claim 95 wherein the formed metal-containing layer is strontium titanate, barium titanate, or barium-strontium titanate.

97. The method of claim 93 wherein M is strontium or barium.

98. The method of claim 93 wherein the metal-containing layer is a metal oxide layer.

99. A method of forming a layer on a substrate, wherein the method comprises:

providing a substrate within a deposition chamber;

providing a vapor comprising one or more Group IIA metal precursor compounds of the formula $M(NRR')_2$ (Formula I), wherein R and R' are each independently an organic group, and M is selected from the group consisting of barium, strontium, calcium, and magnesium;

directing the vapor comprising the one or more precursor compounds of Formula I to the substrate;

providing one or more reaction gases; and

directing the one or more reaction gases to the substrate to form a metal-containing layer on one or more surfaces of the substrate using a chemical vapor deposition process.

100. The method of claim 99 wherein one or more inert carrier gases are introduced into the chamber after the vapor comprising the one or more compounds of Formula I, after the one or more reaction gases, or after both the vapor and the reaction gases.

101. The method of claim 100 wherein the reaction gas is selected from the group consisting of water vapor, oxygen, ozone, hydrogen peroxide, nitrous oxide, ammonia, organic amine, silane, hydrogen, hydrogen sulfide, hydrogen selenide, hydrogen telluride, and combinations thereof.

102. The method of claim 101 wherein the reaction gas is water vapor.

103. The method of claim 100 wherein the metal-containing layer is a metal oxide layer.

104. The method of claim 99 further comprising providing a vapor comprising one or more metal-containing precursor compounds other than the compounds of Formula I and directing this vapor to the substrate.

105. The method of claim 104 wherein providing a vapor comprising one or more metal-containing precursor compounds other than the compounds of Formula I comprises providing a vapor comprising $Ti(AR^1_x)_4$, wherein: A is O, N, C(O), or OC(O); and R^1 is a (C1-C10)alkyl group, wherein two of the R^1 alkyl groups are optionally joined together to form an alkylene group; and n = 1 or 2.

106. The method of claim 104 wherein the vapor comprising the one or more compounds of Formula I and the vapor comprising one or more compounds other than those of Formula I are directed to the substrate prior to directing the one or more reaction gases to the substrate.

107. The method of claim 104 wherein the vapor comprising the one or more compounds of Formula I and the vapor comprising one or more compounds other than those of Formula I are directed to the substrate substantially simultaneously.

108. The method of claim 104 comprising:

providing a vapor comprising one or more precursor compounds of Formula I and directing this vapor to the substrate;

providing one or more reaction gases and directing the one or more reaction gases to the substrate;

providing a vapor comprising one or more precursor compounds other than those of Formula I and directing this vapor to the substrate; and

providing one or more reaction gases and directing the one or more reaction gases to the substrate to form a metal-containing layer on one or more surfaces of the substrate.

109. The method of claim 99 wherein the providing a vapor, directing the vapor, providing one or more reaction gases, and directing the one or more reaction gases is repeated at least once.

110. The method of claim 99 wherein the Group IIA metal precursor compound is of the formula $M[N(SiR"_3)_2]_2$, wherein each R" is independently a (C1-C3)alkyl moiety.

111. A method of manufacturing a memory device structure, the method comprising:

providing a substrate having a first electrode thereon;

providing one or more Group IIA metal precursor compounds of the formula $M(NRR')_4$, wherein R and R' are each independently an organic group and M is selected from the group consisting of barium, strontium, calcium, and magnesium;

vaporizing the one or more precursor compounds;

directing the one or more vaporized precursor compounds to the substrate;

providing one or more reaction gases;

directing the one or more reaction gases to the substrate to form a dielectric layer on the first electrode of the substrate using a chemical vapor deposition process; and

forming a second electrode on the dielectric layer.

112. The method of claim 111 wherein the Group IIA metal precursor compound is of the formula $M[N(SiR"_3)_2]_2$, wherein each R" is independently a (C1-C3)alkyl moiety.

113. An chemical vapor deposition apparatus comprising:

a deposition chamber having a substrate positioned therein; and

one or more vessels comprising one or more Group IIA metal precursor compounds of the formula $M(NRR')_2$, wherein R and R' are each independently an organic group and M is selected from the group consisting of barium, strontium, calcium, and magnesium.

114. The apparatus of claim 113 wherein the Group IIA metal precursor compound is of the formula $M[N(SiR"_3)_2]_2$ where M is strontium or barium and R" is a (C1-C3)alkyl moiety.